



RF-1501

Spectrofluorophotometer

*World's smallest spectrofluorophotometer
with first class performance!*

Compact, yet high performance

Outstanding Sensitivity — 300 or higher signal-to-noise ratio

The unique RF-1501 optical design provides exceptional sensitivity in an incredibly compact instrument.

The bright optical system and noise suppression digital filter allow for high sensitivity measurement.

You get a signal-to-noise ratio greater than 300 for the Raman lines of distilled water.

No Waiting for Data — high speed scanning

The scanning speed is selectable in 4 steps, the fastest being 3,700 nm/min.

And, wavelength slewing is possible at ultrahigh speeds reaching 30,000 nm/min.

Automatic Search of Optimal Wavelengths

The search function of the RF-1501 enables automatic detection of the optimal excitation and emission wavelengths for your sample. You can let the instrument automatically select wavelengths or consult with the instrument on the new samples.

Uninterrupted Quantitation over a Wide Concentration Range

The 20 bit A/D converter provides high resolution over a wide dynamic range, allowing you to perform reliable quantitation of wide concentration range without attenuation.

Pop-in Program Packs to Meet Your Needs

In seconds, the easy-to-insert Program Packs reconfigure the RF-1501 from the standard quantitative and scanning instrument to a kinetics capable instrument, for example. You can even store your own experimental parameters on convenient Data Packs (IC RAM card).

Sample Cell Holder Can be Pulled out for Easy Operation.

With the lid of the sample compartment open, the cell holder can be pulled out, which ensures ease and simplicity of sample setting.



Drawer-type Sample Compartment

Open the cover and pull out the sample compartment, and the sample can be set rapidly and easily.



Light Source

A 150 W xenon lamp and its highly stable power circuit combine to ensure exceptional high sensitivity.



Backlit Liquid Crystal Display

Keypad

Keys are arranged to make operation easy and intuitive.

IC Card Slot

The optional Program Packs (IC cards) allow various applications to be carried out through simple operation. Use of the appropriate Program Pack reconfigures your RF-1501 into an instrument dedicated to the particular application, e.g. kinetics.

Also, Data Pack (RAM card) is available to store your own experimental parameters and data.



Interfaces

◆ Interface for Printers

Centronics interface to permit direct connection to most commercially available printers for PC use.

◆ RS-232C Interface

RF-1501 data can be easily transferred to a PC via an interface cable.

◆ I/O-1

Used to connect an ASC-5 Auto Sampler to build an automated spectrofluorophotometry system.

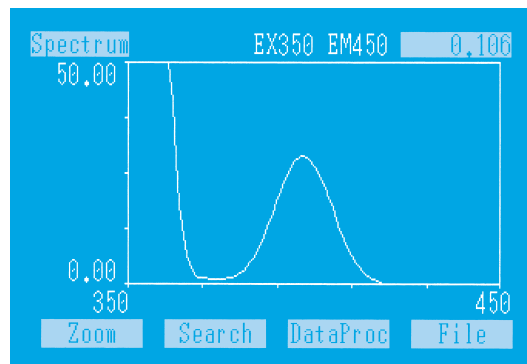
◆ I/O-2

Used to connect a sipper.

Outstanding Simplicity of Operation...

Exceptionally High Sensitivity

The RF-1501 uses blazed holographic, concave gratings, a non-spherical condenser lens, and the latest digital signal processing circuit, to provide exceptionally high sensitivity, expected only with a more expensive instrument. The signal-to-noise ratio for the Raman lines of distilled water is higher than 300.



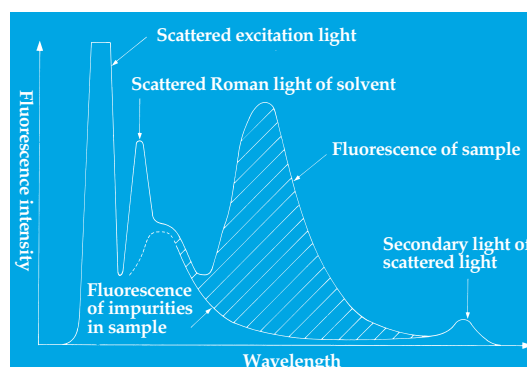
High Speed

Scanning speed is selectable in 4 steps, with superfast wavelength collection at 3,700 nm/min. The spectrum of anthracene shown to the right, for example, is obtained in about 3 seconds. And, wavelength slewing is possible at ultrahigh speed of about 30,000 nm/min. (500 nm/sec.). This allows wavelength to be set to the desired point in an instant.



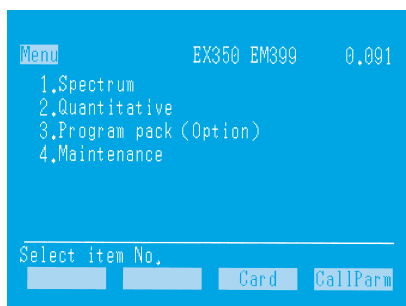
Automatic Search of Optimal Wavelengths

The search function enables automatic detection of the optimal excitation and emission wavelengths for your sample, by automatically distinguishing the emission light from the scattered excitation light, Raman scattered light, and secondary light.



All You Do is to Select the Menu: the RF-1501 Will Do All the Rest.

Menu Screen



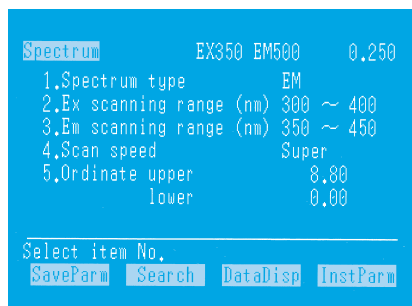
Menu EX350 EM399 0.091

- 1.Spectrum
- 2.Quantitative
- 3.Program pack (Option)
- 4.Maintenance

Select item No.

Card CallParm

Wavelength Scan

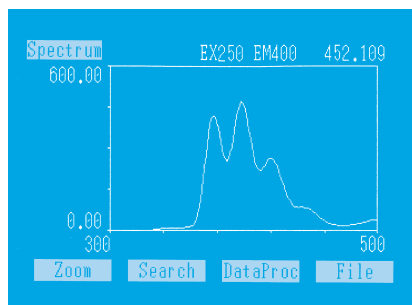


Spectrum EX350 EM500 0.250

- 1.Spectrum type EM
- 2.Ex scanning range (nm) 300 ~ 400
- 3.Em scanning range (nm) 350 ~ 450
- 4.Scan speed Super
- 5.Ordnate upper 8.80
- lower 0.00

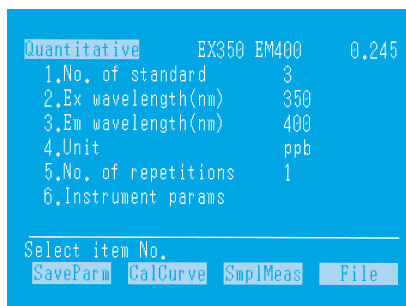
Select item No.

SaveParm Search DataDisp InstParm



Various convenient functions available include automatic search of optimal excitation and emission wavelengths, automatic response control to prevent shift of peaks, automatic shutter to prevent sample deterioration, and data processing, such as peak pick and difference spectrum measurement.

Quantitative

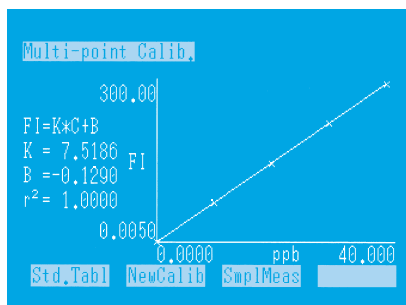


Quantitative EX350 EM400 0.245

- 1.No. of standard 3
- 2.Ex wavelength(nm) 350
- 3.Em wavelength(nm) 400
- 4.Unit ppb
- 5.No. of repetitions 1
- 6.Instrument params

Select item No.

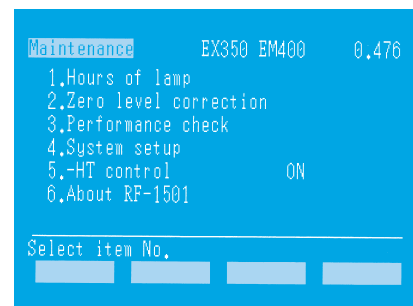
SaveParm CalCurve SmplMeas File



A working curve is displayed on the LCD, to permit its easy confirmation.

A calibration curve may be easily corrected simply by re-measuring the standard samples.

Maintenance/Setting



Maintenance EX350 EM400 0.476

- 1.Hours of lamp
- 2.Zero level correction
- 3.Performance check
- 4.System setup
- 5.-HT control ON
- 6.About RF-1501

Select item No.

The run time of the xenon lamp may be monitored and the printer parameters easily set, and the instrument be diagnosed, through simple operation.

A Wide Variety of Options

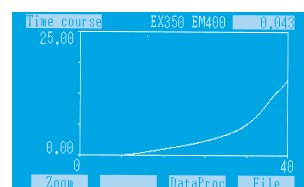
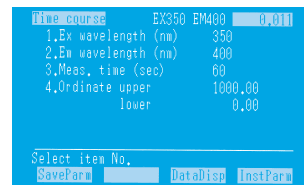
Note: The catalog numbers ending with**will have the last two digits specified by us or your local distributor.

Time Course Program Pack (Cat. No. 206-67901)



Measures changes in fluorescence intensity for constant excitation and emission wavelengths, with respect to time. The changes are presented as time-course curves.

- 1) Stores or recalls time-course curves from the internal memory or from a Data Pack™ IC card.
- 2) Expands or compresses time-course curves.
- 3) Puts up to 5 event marks on a time-course curve.
- 4) Selects measurement times between 5 and 6,500 seconds.
- 5) Supports linked operation with a sipper unit option.

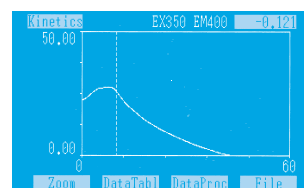
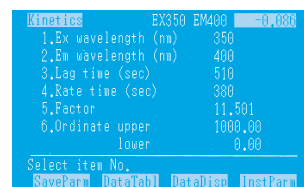


Kinetics Program Pack (Cat. No. 206-67901-01)

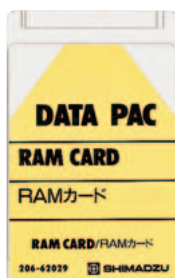


Measures changes in fluorescence intensity with respect to time, calculates the rate of change, and converts it into activity value, in a completely automated sequence. The time-course curve is displayed and the kinetic activity values are tabulated after measurement.

- 1) Selects lag time up to 500 seconds.
- 2) Selects rate time between 5 and 6,000 seconds.
- 3) Stores or recalls time-course curves from the internal memory or from a Data Pack™ IC card.
- 4) Expands or compresses time-course curves.
- 5) Presents the initial emission light intensity, rate of change of emission light intensity, and activity value.
- 6) Supports linked operation with a sipper unit option.



Data Pack (Cat. No. 206-62029)



- 1) Stores up to 60 sets of operational parameters.
- 2) Stores up to 9 data sets, obtained in spectrum measurement, time-course measurement, kinetics measurement, or quantitative measurement.

Parameters list	3 ~ 11 : Data pack
1.TEST	7.
2.BLANK	8.
3.SP1	9.
4.SP2	10.
5.	11.
6.	
Display	Save Transfer Header

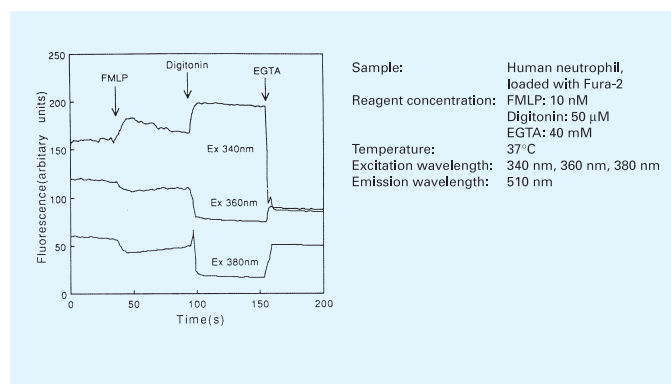
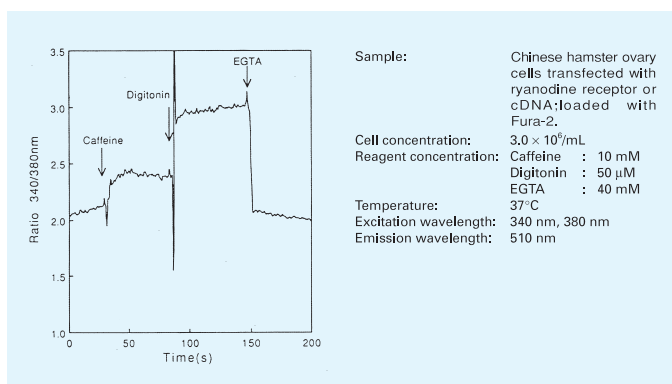
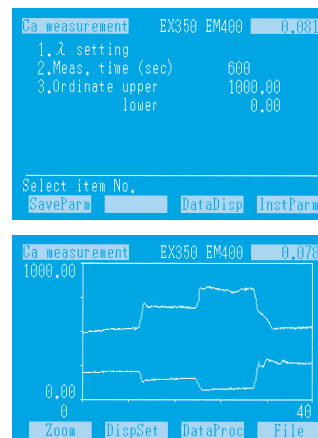
Parameters list	4 ~ 63 : Data pack
1.AA	8.
2.BEB	9.
3.	10.
4.CASE1	11.
5.	12.
6.	13.
7.	14.
Page	Save

Ca Measurement Program Pack (Cat. No. 206-67901-05)



Measures the concentrations of intracellular ions, such as Ca^{2+} , H^+ , Mg^{2+} , and K^+ , using Fura-2, Quin-2, or BCECF as the fluorescent probe.

- 1) Permits simultaneous measurement at up to four wavelength sets.
- 2) Takes data at 0.2 second interval (minimum) in the dual wavelength measurement of samples loaded with Fura-2.
- 3) Incorporates all the necessary data processing functions, such as ratio calculation, Ca^{2+} concentration computation, and background correction.



System Construction of Intracellular Calcium Measurement System

RF-1501 Spectrofluorophotometer

(Cat. No. 206-62901-**)

Syringe Adapter

(Cat. No. 206-69266)

Ca Measurement Program Pack

(Cat. No. 206-67901-05)

HCP-1B

(Cat. No. 206-89847-**)

Constant-Temperature Cell Holder, with stirrer

(Cat. No. 206-80496)

NTT-2200P Constant-Temperature Water Circulator

(Cat. No. 208-97263)

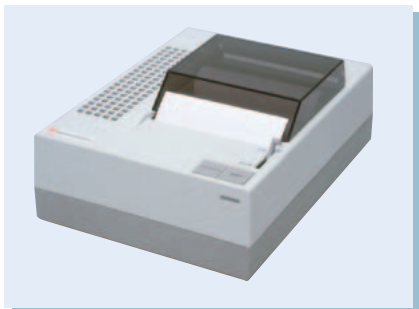
Stirrer Controller

(Cat. No. 044-31006-**)

HCP-1B

(Cat. No. 206-89847-92...120 ¥)
(Cat. No. 206-89847-93...220 ¥)

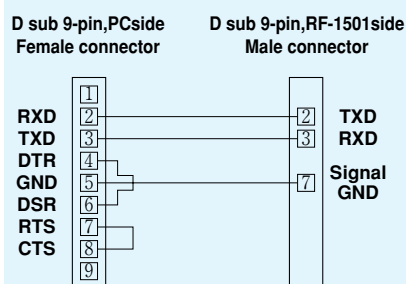
- Compact enough to be placed on the RF-1501 main.
- Prints out numeric data, and also, presents hard-copy of display images.
- Standard accessories
 - AC adapter
 - 1 roll of thermal chart paper
 - Centronics interface cable
- Supplies
 - Thermal chart paper (5 rolls)
(Cat. No. 200-91032-10)



RS-232C Cable, Type 2

(Cat. No. 200-86408)

- Permits communication with an IBM-PC/AT computer or compatible.
- Has a 9-pin female connector on the PC side and a 9-pin male connector on the RF-1501 side. The connections are made as shown below



Quartz Cell Polished on Four Sides

(Cat. No. 200-34441)

Non-Fluorescent Cell

(Cat. No. 200-34594-03)

When excited with a light of 240 ~ 260 nm, an ordinary quartz cell emits a weak fluorescence of about 400 nm, attributable to impurities in the cell material.

The Quartz Cell Polished on Four Sides has a minimal fluorescence, but in extremely trace analysis, it is recommendable to use Non-Fluorescent Cell which is made of special quartz.



Micro Cell

(Cat. No. 206-80047)

- Permits measurement of samples as small as 500 μ L in volume.
- Readily held in an ordinary cell holder, because the external dimensions are the same as a 10 mm square cell.



Filter Set

(Cat. No. 206-80154)

- A set of eight filters: UV-30, L-42, Y-46, Y-50, O-56, R-60, U-340, and B-390. Cuts scattered light and its secondary light.



Syringe Adapter

(Cat. No. 206-69266)

- Permits sample injection with a microliter syringe, in time-course or kinetics measurement, for example.
- To be inserted into the reagent inlet above the cell holder. Since it is not necessary to open the lid of the sample compartment, external light is completely kept off.
- Use a syringe, with a barrel less than 9 mm OD and with a needle less than 0.8 mm OD.
- Options: Hamilton microliter syringes
 - 10 μ L volume (Cat. No. 670-12098-10)
 - 25 μ L volume (Cat. No. 670-12098-11)
 - 50 μ L volume (Cat. No. 670-12098-12)
 - 100 μ L volume (Cat. No. 670-12098-13)



Solid/Powder Sample Holder

(Cat. No. 206-67779)

- Used for the measurement of solid or powder samples in the reflection mode.
- The angle of the holder is adjusted so that the directly reflected excitation beam may not enter the emission monochromator.
- Standard accessories
 - Powder sample tray: 1 pc.
 - Quartz plate: 1 pc.
 - Spacer 1: 2 pcs.
 - Spacer 2: 1 pc.
 - Powder leveling rod: 1 pc.
 - Spacer 2: 1 pc.
 - Powder leveling rod: 1 pc.
- Options
 - Filter set (Cat. No. 206-80154)
 - Minimizes the influence of scattered light.



8 mm dia. Test Tube Holder

(Cat. No. 206-69956)

- Holds a test tube, 8 mm OD.
 - Used for measurements in a wavelength range longer than 400 nm, because the ordinary glass used for test tubes are opaque in the UV region. Test tubes made of Pyrex glass are used in a wavelength range longer than 350 nm.
 - Accepts a test tube, 8 mm OD and 50 to 85 mm long.
 - Options: 8 mm dia. test tube (Pyrex glass)
- (Cat. No. 208-97200)



12 mm dia. Test Tube Holder

(Cat. No. 206-67777)

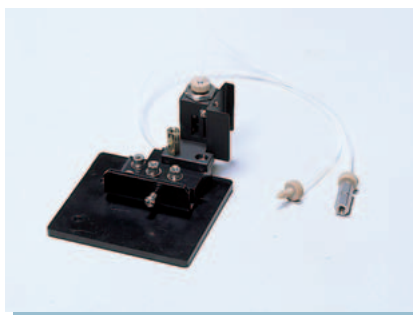
- Holds a test tube, 12 mm OD., in place of an ordinary square cell.
 - Used for measurements in a wavelength range longer than 400 nm, because the ordinary glass used for test tubes is opaque in the UV region. Test tubes made of Pyrex glass are used in a wavelength range longer than 350 nm.
 - Accepts a test tube, 12 mm OD and 45 to 85 mm long.
 - Options: 12 mm dia. test tube (Pyrex glass)
- (Cat. No. 200-93068)



Flow-Thru Cell Unit for HPLC

(Cat. No. 206-69220)

- Converts an RF-1501 into a spectrofluorometric detector for HPLC.
 - An analog output interface is required when the data is to be processed with a data processor, e.g. Chromatopac.
 - Standard accessories
 - Flow-thru cell: Square cell made of fused silica
 - Cell volume: 12 μ L
 - Pressure resistancy of cell: 2.9×10^6 Pa (30 kgf/cm²)
 - Related items
 - Analog Output Interface
- (Cat. No. 206-69240)



Sensitivity Enhancing Cell Holder

(Cat. No. 206-67783)

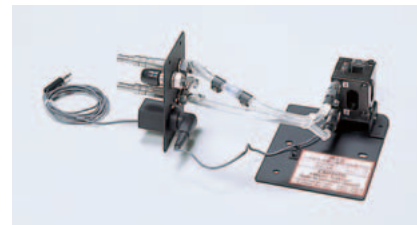
- Enhances measuring sensitivity two or three times, by reflecting back the light that has transmitted through the cell to make it pass the cell again, to raise the excitation efficiency.
- Also enhances the light capture yield by reflecting the emission beam, emitted to the other side of the emission monochromator, back to that monochromator.



Constant-Temperature Cell Holder with Stirrer

(Cat. No. 206-80496)

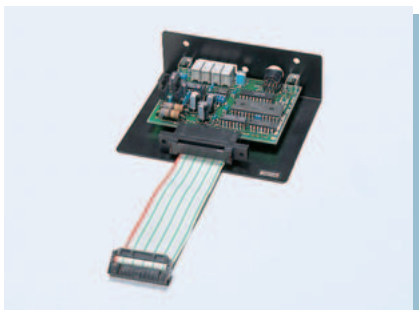
- Keeps the sample cell at the desired, constant temperature, by circulating temperature controlled water.
- Effective for temperature-sensitive applications, such as measurement of intracellular calcium ions.
- Equipped with a magnetic stirrer to stir the sample during measurement.
(The stirrer controller is required, which is described below.)
- Specifications
 - Method: Forced circulation of temperature controlled water
 - Applicable sample cell: 10 mm square cell polished on four sides
 - Circulating water temperature: 5°C to 60°C
 - Stirrer speed: 100 to 1,000 r.p.m.
- Related items
 - CC301 Stirrer Controller
 - (Cat. No. 044-31006-*)
 - NTT-1200P Constant-Temperature Water Circulator
 - (Cat. No. 208-97242)



Analog Output Interface

(Cat. No. 206-69240)

- Outputs voltage signals proportional to the fluorescence intensity.
- Specifications
 - Resolution: 18 bits
 - Output: 1 V/FS, 100 mV/FS



ASC-5 Auto Sample Changer

(Cat. No. 204-09100)

- Builds an automatic multisample spectrophotometry system in combination with a sipper unit.
- The aspirating nozzle is programmable to move in the X, Y, and Z (vertical) directions.
- Up to 8 sets of operational parameters, including the size of racks and the number of test tubes, may be memorized in the battery back-up protected files.
- An RS-232C interface (Cat. No. 204-09079) and a GP-IB interface (Cat. No. 204-09155) are optionally available to allow an external computer to control the ASC-5 directly.
- Up to 100 test tubes may be set together on the rack.



R928-08 Photomultiplier Tube

(Cat. No. 200-75021)

- Replacing the standard photomultiplier tube of the RF-1501 with this tube extends the measuring wavelength range to 900 nm.



Sipper Unit 1500

(Cat. No. 206-69720)

- Aspirates solution samples one after another, using a peristaltic pump driven by a stepping motor, to be measured successively.
- Specifications
 - Flow-thru cell: Square flow-thru cell made of fused silica.
 - Cell capacity: 120 μ L
 - Aspiration speed: FAST, MEDIUM, and SLOW.
 - Minimum sample volume: 2 μ L (Less than 1% carry-over)
 - Linked operation with the ASC-5 Auto Sampler possible.
- Standard accessories
 - Drain tank
 - Tygon tube, 2.5 meters long, for pump connection
 - ASC-5 connecting cable
- Options and Supplies
 - Solenoid Valve Unit with wetted parts made of Teflon (Cat. No. 206-69824)
 - SWA-2 Sample Waste Unit (Cat. No. 204-29230)

Note: The tubing of the standard peristaltic pump is not resistant enough against strong acids, strong alkalis, and ester solutions; use of the above mentioned Solenoid Valve Unit and SWA-2 is recommended.

 - Tygon tube for pump (Cat. No. 200-84523-04)



NTT-2200P Constant-Temperature Water Circulator

(Cat. No. 208-97263)

- Circulates temperature controlled water to a constant-temperature cell holder.
- Temperature range: Ambient +5°C to +80°C
- Temperature control precision: $\pm 0.05^\circ\text{C}$
- Max. pumping rate: 27/31 L/min, 9.5/13 m (50/60 Hz)
- External circulation nozzle: 10.5 mm OD (both outlet and return)
- Tank capacity: About 10 L (9 L during use)
- Safety feature:
 - Detection of over-temperature of Upper or Lower limits, Detection of heater wire malfunction, Protection of heating too few circulating water, Detection of sensor malfunction, Independent over heat protection, Over current circuit protector
- Standard accessories:
 - Lid with handles, Rubber hose (4m), Hose clamps (4pc.), Instruction manual
- Dimensions: 270W \times 560H \times 400D (mm)
- Power requirements:
 - 100 VAC, 1250 VA, with 1.7 m power cord and grounded plug



SPECIFICATIONS

- ◆ Light source: Xenon lamp, 150 W, Ozone resolving type lamp housing
- ◆ Excitation/emission monochromators: Concave, non-aberration, blazed holographic grating, F/2.4, 900 grooves/mm
- ◆ Wavelength scale: 220 ~ 900 nm and 0 order
- ◆ Measuring wavelength range: 220 ~ 750nm and 0 order as standard
220 ~ 900nm and 0 order optionally
- ◆ Spectral bandwidth: Choice of 10 nm and 20 nm in both excitation and emission sides
- ◆ Wavelength accuracy: ± 5 nm
- ◆ Light source compensation: Dynode feedback system with monochromatic light monitoring function
- ◆ Sensitivity: The S/N ratio is 300 or higher for the Raman lines of distilled water (350 nm excitation wavelength, 10 nm spectral bandwidth, and 2-second response)
- ◆ Wavelength scanning speed: 4-step selection of SUPER, FAST, MEDIUM, and SLOW, (about 3,700 nm/min. at SUPER)
- ◆ Wavelength slewing speed: About 30,000 nm/min.
- ◆ Response: Choice of 0.02, 0.03, 0.1, 0.25, 0.5, 2, and 8 seconds for 98% of full scale
- ◆ Sensitivity selection: 2-step selection of HIGH and LOW
(The sensitivity at HIGH is about 50 times that at LOW.)
- ◆ Detector: Photomultiplier tube for both excitation and emission sides
- ◆ Display: Backlit liquid crystal display, 320×200 dots
- ◆ Interface: RS-232C interface, and interfaces for printer (Centronics type), autosampler, sipper, and IC card drive
- ◆ Dimensions and weight: 500"×400"×255" mm, 23 kg
- ◆ Power requirements: 100/120/220/240 V, 400 VA
- ◆ Operational temperature range: 10 ~ 35°C
- ◆ Operational humidity range: 40~80%
(Below 70% with temperature higher than 30°C.)

PERFORMANCE

- ◆ Wavelength scanning functions
 - Measurement of excitation and emission spectra
 - Automatic search of optimal excitation and emission wavelengths
 - Automatic response control
 - Automatic shutter
 - Spectrum expansion and compression
 - Readout of spectrum values at the cursor specified points
 - Peak pick
 - Difference spectra
 - Data printout
- ◆ Quantitation
 - Quantitation at fixed wavelengths
 - Working curve generation (1st regression, 10-point)
 - Working curve correction
 - Repeated measurement and data averaging (up to 5 times repetition)
 - Automatic shutter
- ◆ Filing
 - Storage and recall of instrument parameters
Memory size: 3 sets in the main memory and 60 sets in a data pack
 - Storage and recall of measurement data (spectral, time-course, and quantitation) Memory size: 2 sets in the main memory, and 9 sets in a data pack
 - Data transmission to PC: Via RS-232C interface (MS-DOS text file format)
- ◆ Others
 - Supply of optional programs from IC Program Packs
 - Storage and recall of instrument parameters and data from Data Pack
 - Monitoring and display of the run time of xenon lamp



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